

Project Title

Mini C-arm Protector

Project Lead and Members

- RN Zhu Hai Fang
- Dr Andy Yeo

Organisation(s) Involved

Changi General Hospital

Healthcare Family Group Involved in this Project

Nursing, Medical

Specialty or Discipline

Orthopaedic

Aims

Eliminate damage to Mini C-arm detector

Background

See poster appended / below

Methods

See poster appended / below

Results

See poster appended / below

Lessons Learnt

See poster appended / below

Conclusion

See poster appended / below

Additional Information

Singapore Healthcare Management (SHM) Conference 2021 – Shortlisted Project
(Operations Category)

Project Category

Care & Process Redesign, Quality Improvement, Value Based Care, Productivity, Cost Saving, Technology, Product Development, Prototyping Resources

Keywords

Orthopedic Imaging, Double Layer Acrylic Protector

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Mini C-arm Protector-

The Shield that protects the Mini C-arm

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Introduction

The Mini C-arm combines the components of a standard full-sized C-arm into a compact one-piece system designed especially for extremity orthopedic imaging. It is widely used in orthopedic surgeries especially in upper limb and foot/ankle surgeries.



Full view of Mini C-arm

During the surgery, the surgeon places the operated limb on the flat detector of the Mini C-arm. The surgeon drills the limb under guidance from the imaging concurrently. However, at times, due to the size and the density of the bones, the drill bits may go thru the bones causing damages to the Mini C-arm drape or even the detector.

The following are problems that arise from damages to Mini C-arm detector:

- High repair cost
- Long downtime of the machine for replacement of damaged parts
- Delay in surgeries due to lack of machines

Objective: Eliminate damage to Mini C-arm detector.



Upper limb surgery with Mini C-arm



Lower limb surgery with Mini C-arm



Holes on Mini C-arm detector and cover

Methods

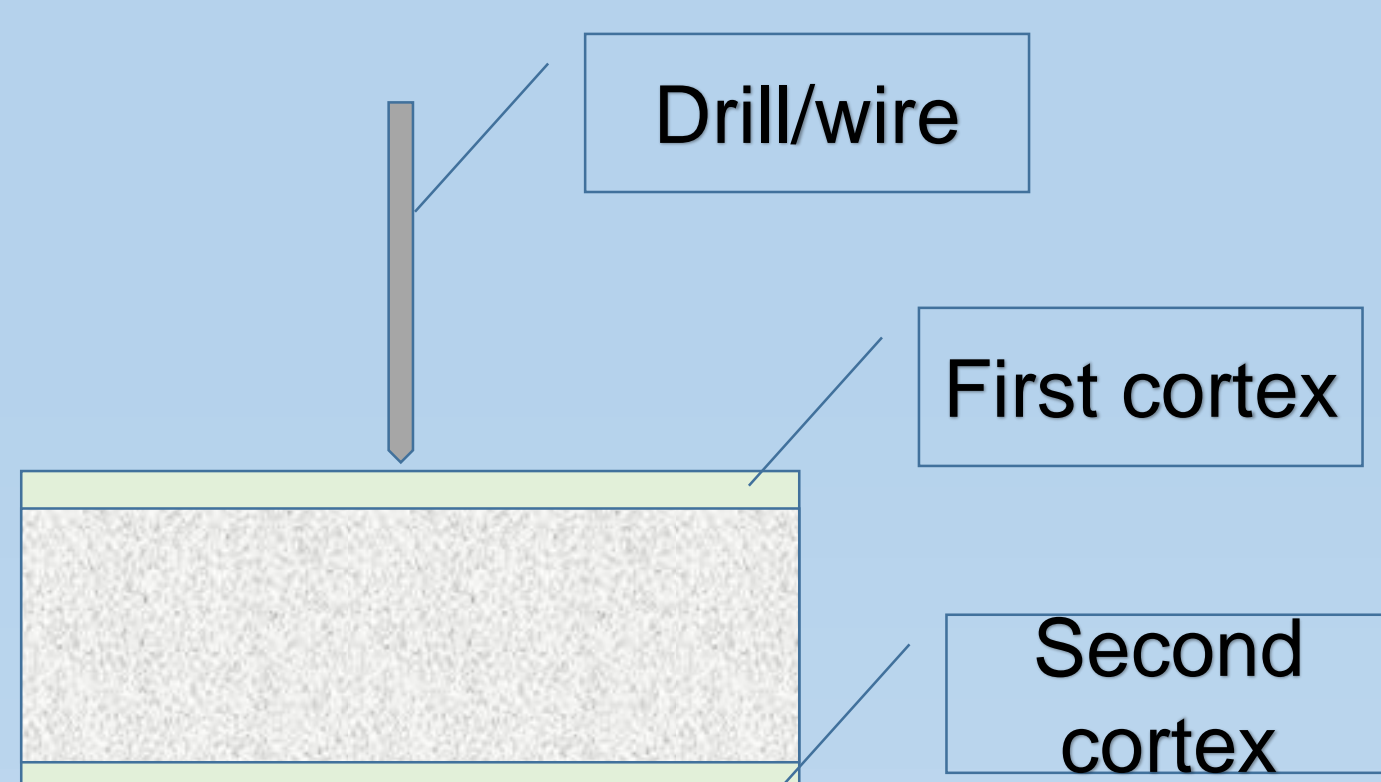
Using stack of linen to protect the flat detector



Custom made a single layer acrylic plastic protector



Custom made double layer acrylic plastic protector



Results

- Time consuming to secure and remove the stack of linen
- Drill/wires are sharp, they still penetrates through linen and causes damages to the detector
- Incident of penetration onto the flat detector (machine breakdown)

- More durable compared to stack of linen
- Likely chances of penetration onto the machine when not cautious (6 puncture holes found on the acrylic protector)

- Double protections
- Eliminate chances of penetration onto the mini c-arm
- Removable for cleaning and maintenance of the machine
- Washable and safe to use disinfectant for infection control purpose

Description		Repair cost (\$)	Total (\$)
Repair of	Flat detector	28,372.50	29778.75
	Flat detector cover	1406.25	
Cost of fabricating acrylic protector	Single layer	150	330
	Double layer	180	
Cost saving			29448.75

Table 1 Cost analysis

Conclusion

The idea of double layer acrylic protector was originated from the concept of dual cortex of the bone structure. The team brainstormed to customize protector for the mini c-arm. The design of the protector was enhanced through the PDSA cycle.

This project eliminates the incidences of damages to the Mini C-arm detector from accidental drill through onto the detector. It saves expensive repair cost of \$29448.75 (Table 1). Most importantly, it reduces unnecessary machine downtime which has impact on patient care and staff satisfaction.